The Knowledge and Best Practice Hub of the EMERGE Project

EMERGE
Emerging Printed Electronics Research Infrastructure

Agenda

1. Pasiphae Lab Overview
2. Data Science
3. FAIR Data
4. The Emerge Project
    1. KBest Platform
        1. Data Repository
    2. UI Mock-ups

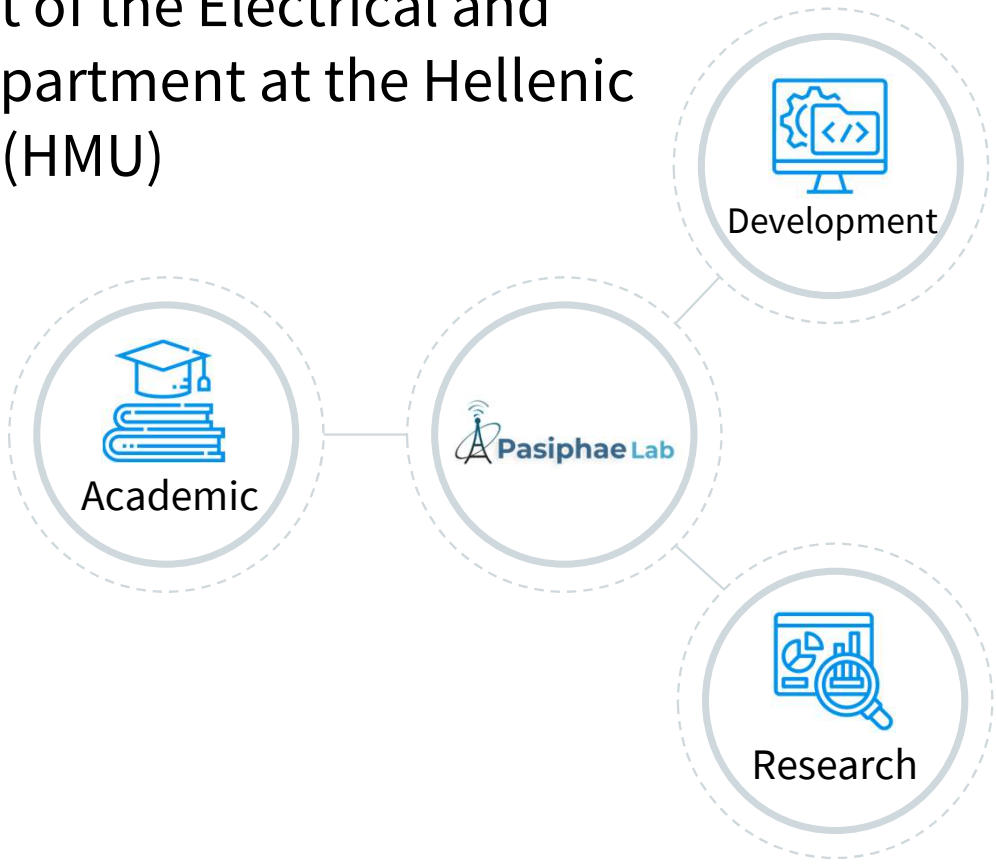
1.

Pasiphae Lab

Overview | Activities

Pasiphae Lab

Pasiphae is a research unit of the Electrical and Computer Engineering Department at the Hellenic Mediterranean University (HMU)



Pasiphae Lab Activities

Active in Computer Networks

- Cybersecurity
- Emergency Communication Networks
- IoT ecosystem etc.

Participates in European and national projects

- Development of software and digital applications
- Technical supervision

Development of technologies

To contribute to the provision of equal opportunities to all people regardless of their age, their gender, their capabilities, or the geographical area in which they are located

2.

Data Science

Overview | Applications

Data Science Overview

Data science deals with vast volumes of data using modern tools and techniques to find unseen patterns, derive meaningful information, and make business decisions.

Data Science Applications

1. Healthcare
2. Gaming
3. Image Recognition
4. Recommendation Systems
5. Logistics
6. Fraud Detection
7. Internet Search
8. Speech Recognition
9. Targeted Advertising
10. Airline Route Planning
11. Augmented Reality

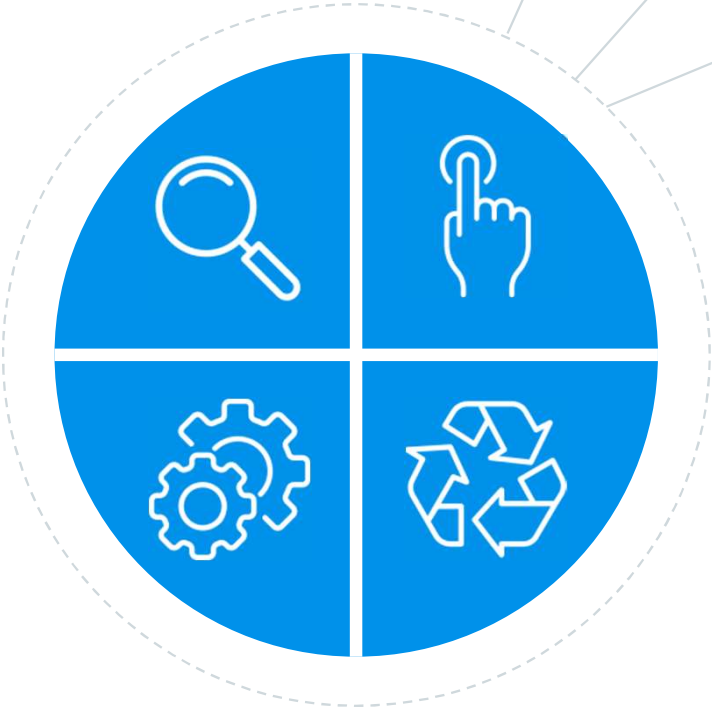
3.

FAIR Data

Overview | Principles

FAIR Overview

FAIR Data[1] refer to the principles defined in 2016 by a consortium of scientists and organizations



[1] Wilkinson MD, Dumontier M, Aalbersberg IJ, et al. The FAIR Guiding Principles for scientific data management and stewardship [published correction appears in Sci Data. 2019 Mar 19;6(1):6]. Sci Data. 2016;3:160018. Published 2016 Mar 15. doi:10.1038/sdata.2016.18

FAIR Guiding Principles (1/2)

Findability

Data and metadata must be easy to find by both humans and computers.

Interoperability

Data and metadata must interoperate with applications or workflows for analysis, storage and processing.

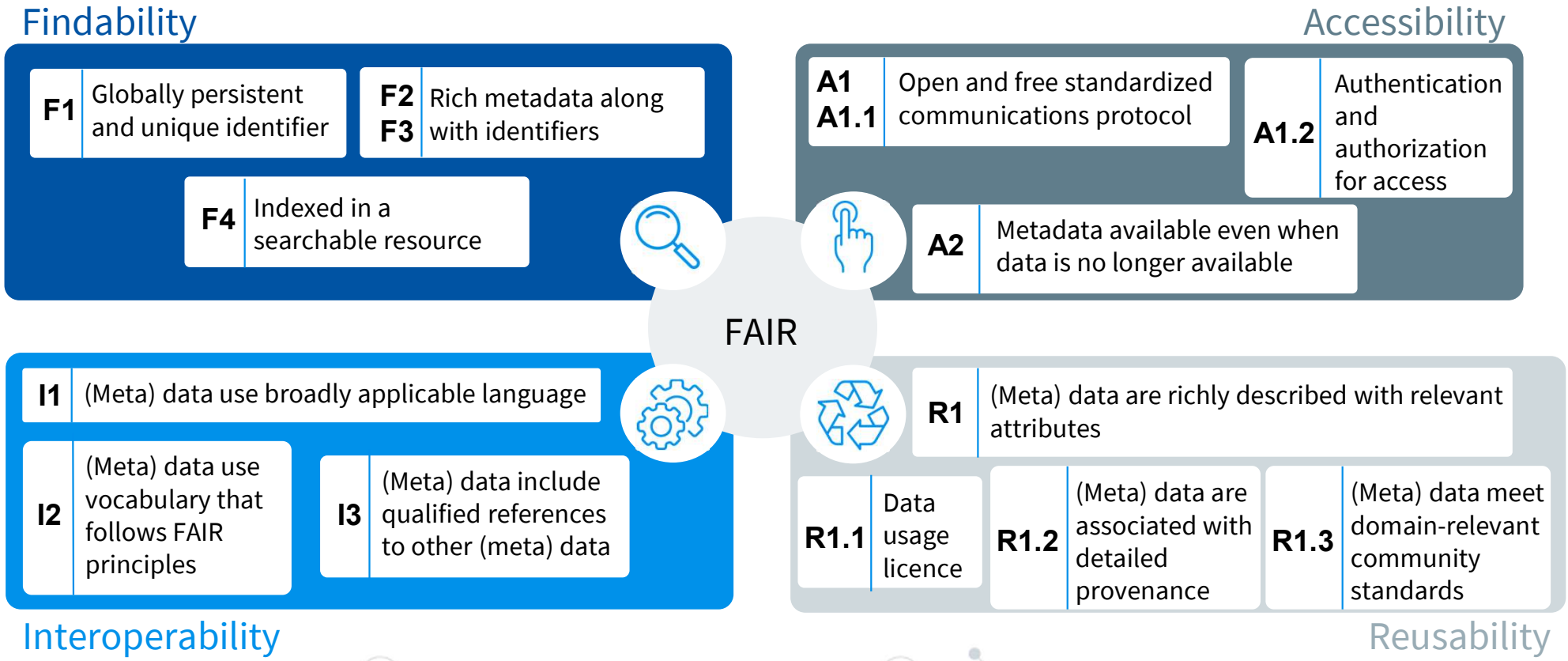
Accessibility

Data and metadata must be accessible, possibly with auhentication and authorization infrastructures.

Reusability

Data and metadata must be well-described so that they can be replicated and/or combined in diferent settings.

FAIR Guiding Principles (2/2)



https://www.go-fair.org/fair-principles/

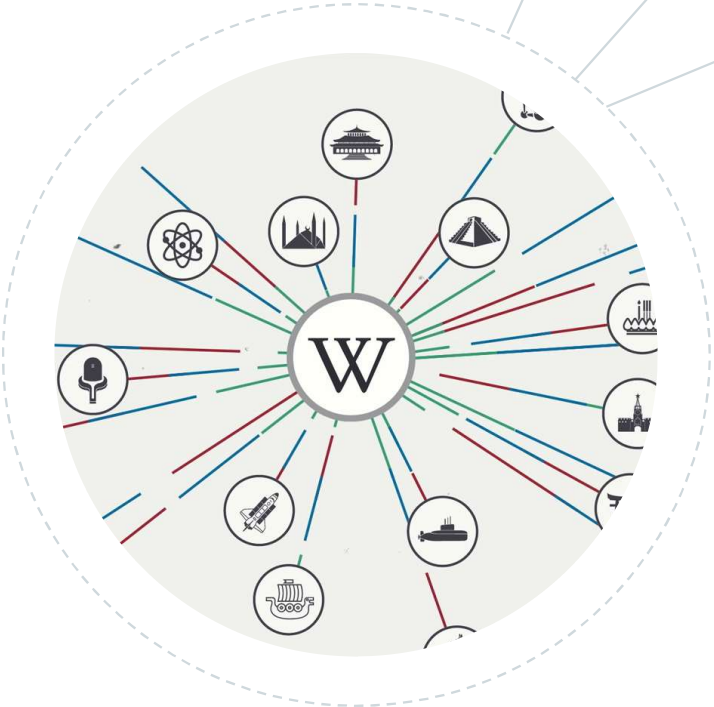
4.

Digital Repositories

Overview

Digital Repositories Overview

- Digital repository is a collection of systems and services that store, manage, display, retrieve, and reuse digital objects[2].
- Open repositories can make knowledge more accessible, discoverable, mineable, interoperable, and permanently available



[2] Pinfield, S., Salter, J., Bath, P.A., Hubbard, B., Millington, P., Anders, J.H. and Hussain, A. (2014), "Open access repositories worldwide, 2005–2012: past growth, current characteristics, and future possibilities", Journal of the Association for Information Science and Technology, Vol. 65 No. 12, pp. 2404-2421

5.

The EMERGE Project

Overview

Emerge Overview

Emerging Printed Electronics Research Infrastructure (EMERGE)[3] is a pioneer research infrastructure supporting comprehensive user projects for leading-edge multi-and-trans-disciplinary research on sustainable Flexible Large-Area Printed Electronics and Photonics (FLAPEP).

Among others, Emerge will provide:

- To use a technology toolkit for the knowledge domain
- To create a state-of-the-art repository based on real-time feedback to bring best practices and knowledge sharing together in one place

[3] https://emerge-infrastructure.eu/

5.1

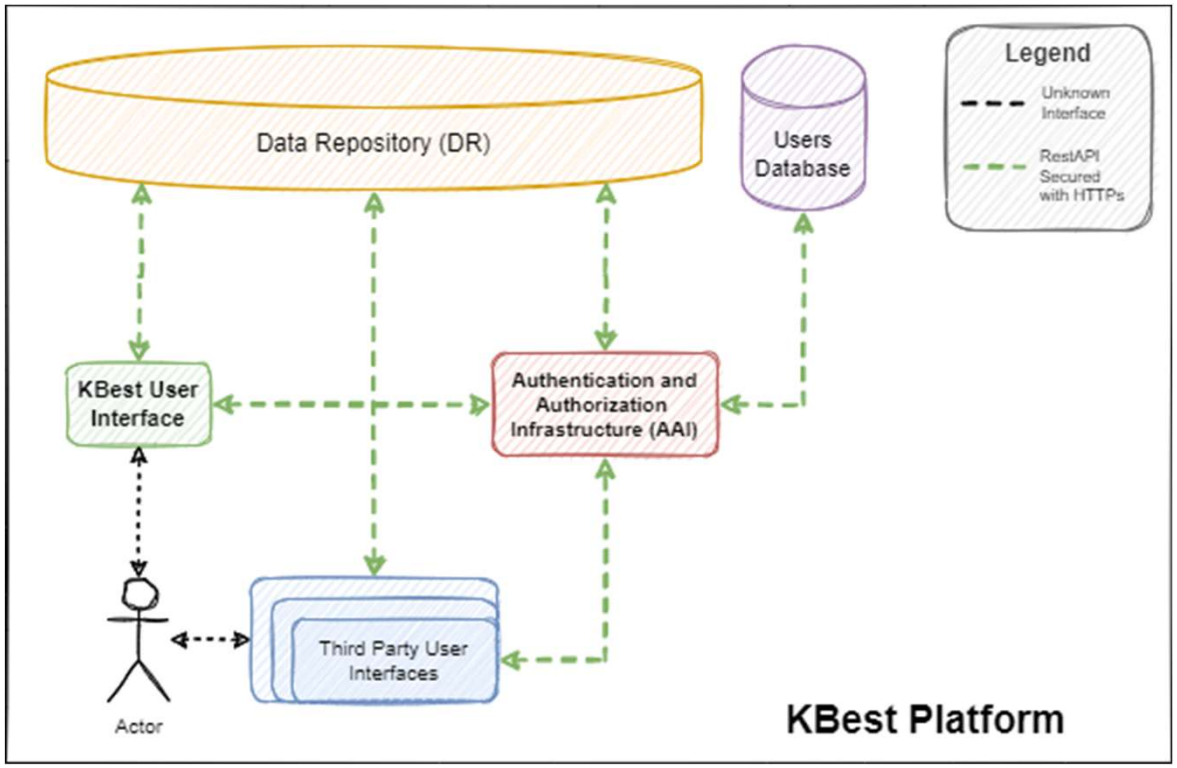
KBest Platform

Overview | Conceptual Diagram | Architecture Diagram

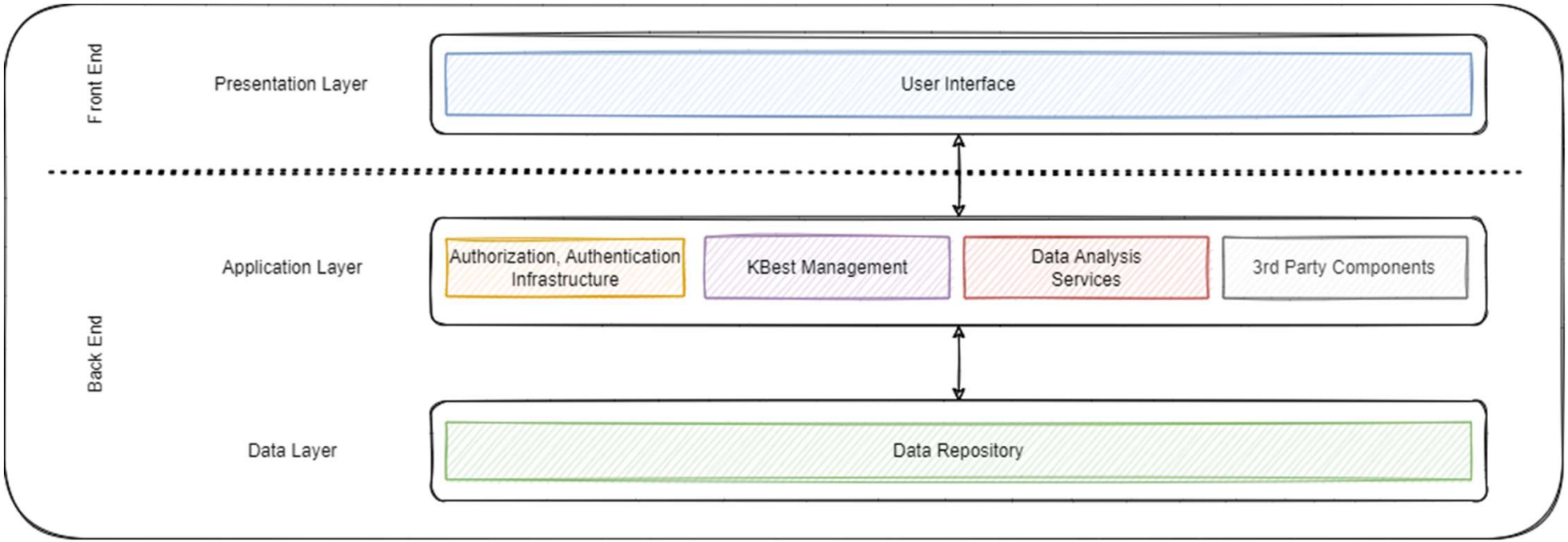
KBest Platform Overview

- Knowledge and Best Practice Hub (KBest) is the platform that will enable Emerge to create a repository that will store all domain-specific data, that relate to the printing procedures acquired within the project
- KBest will include long-term preservation and curation for all the data. It will enable all the needed tools to allow users to search, discover and retrieve them.
- The online data analysis tools will allow quality to be maintained, add value to the data, and provide the means for data re-use over time.
- KBest will include a repository which will contain data relating to design, modelling, and simulation experiments, material synthesis and characterization, prototypes fabrication experiments, and test, validation, and characterization of demonstrators.

KBest Platform Conceptual Diagram



KBest Platform Architecture Diagram

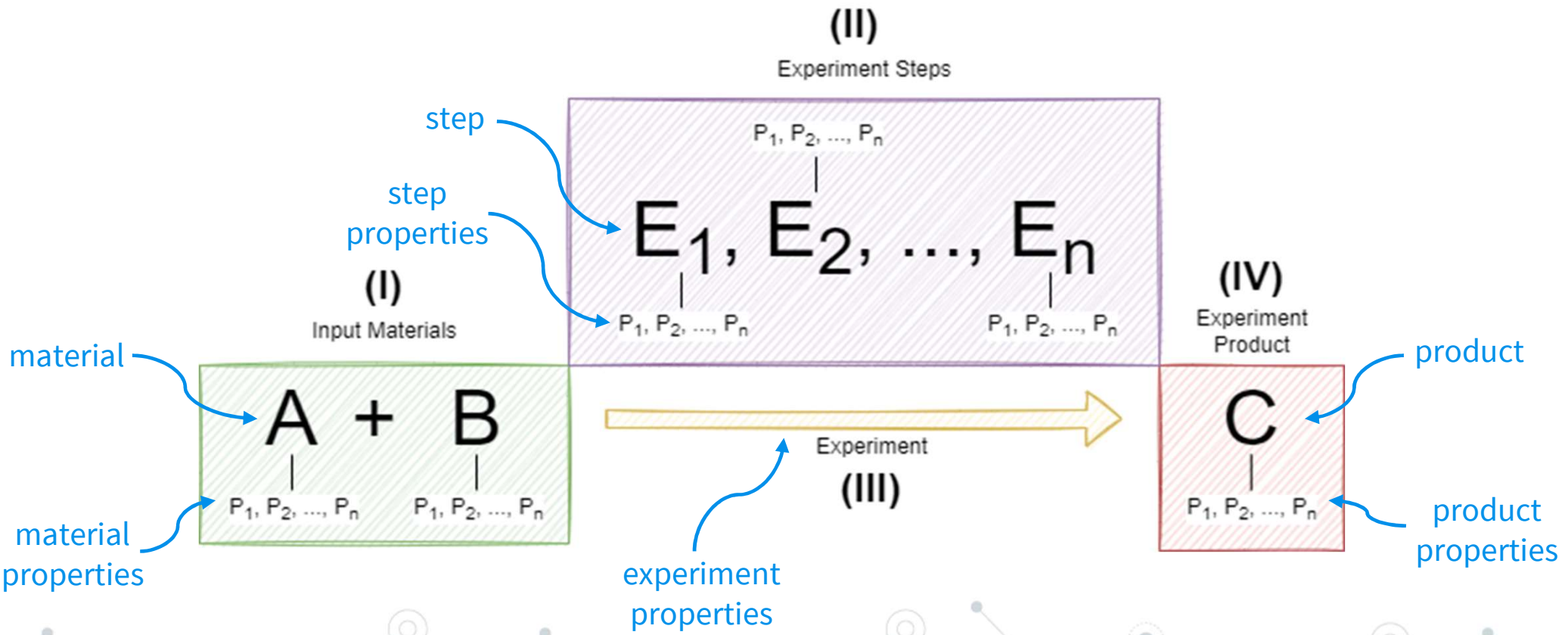


5.1.1

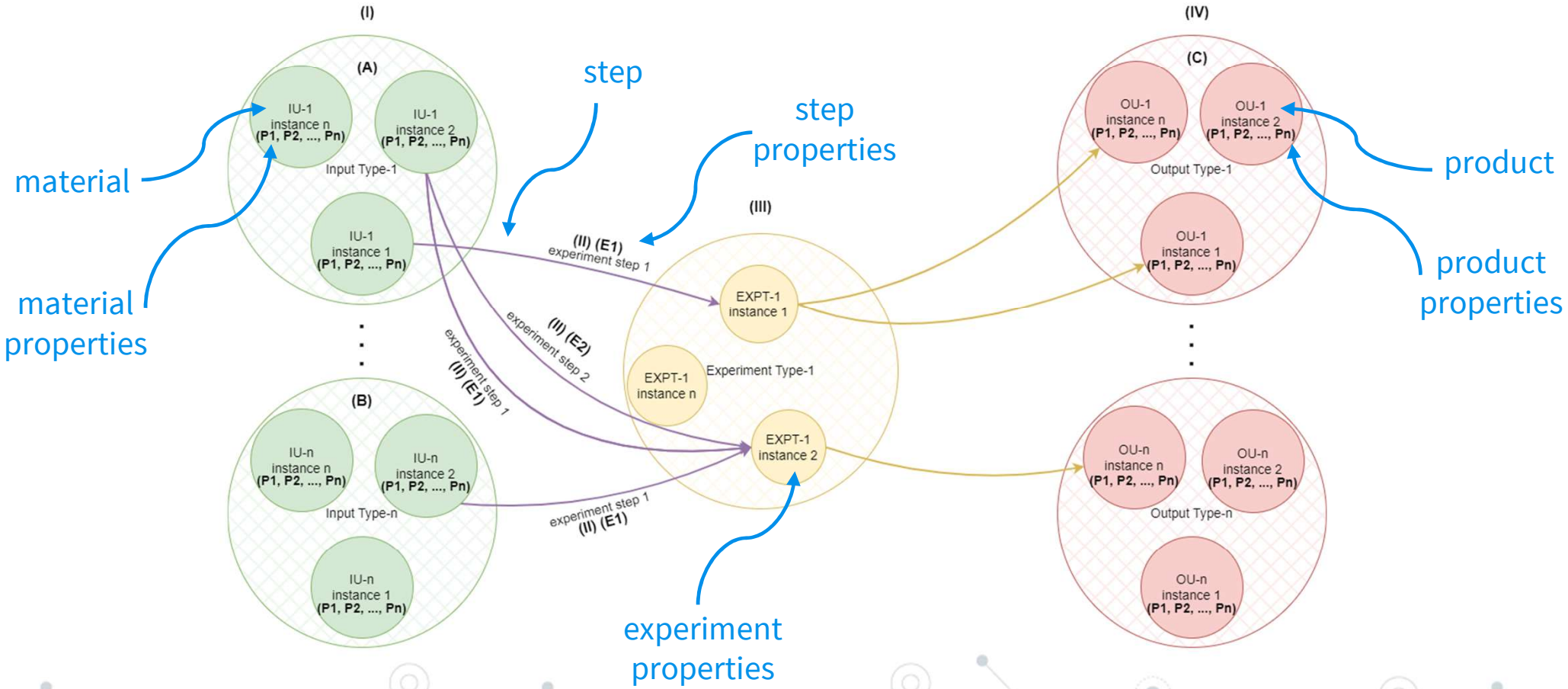
Data Repository

Experiment Structure | Experiment Data Structure

Example Structure of an Experiment Process



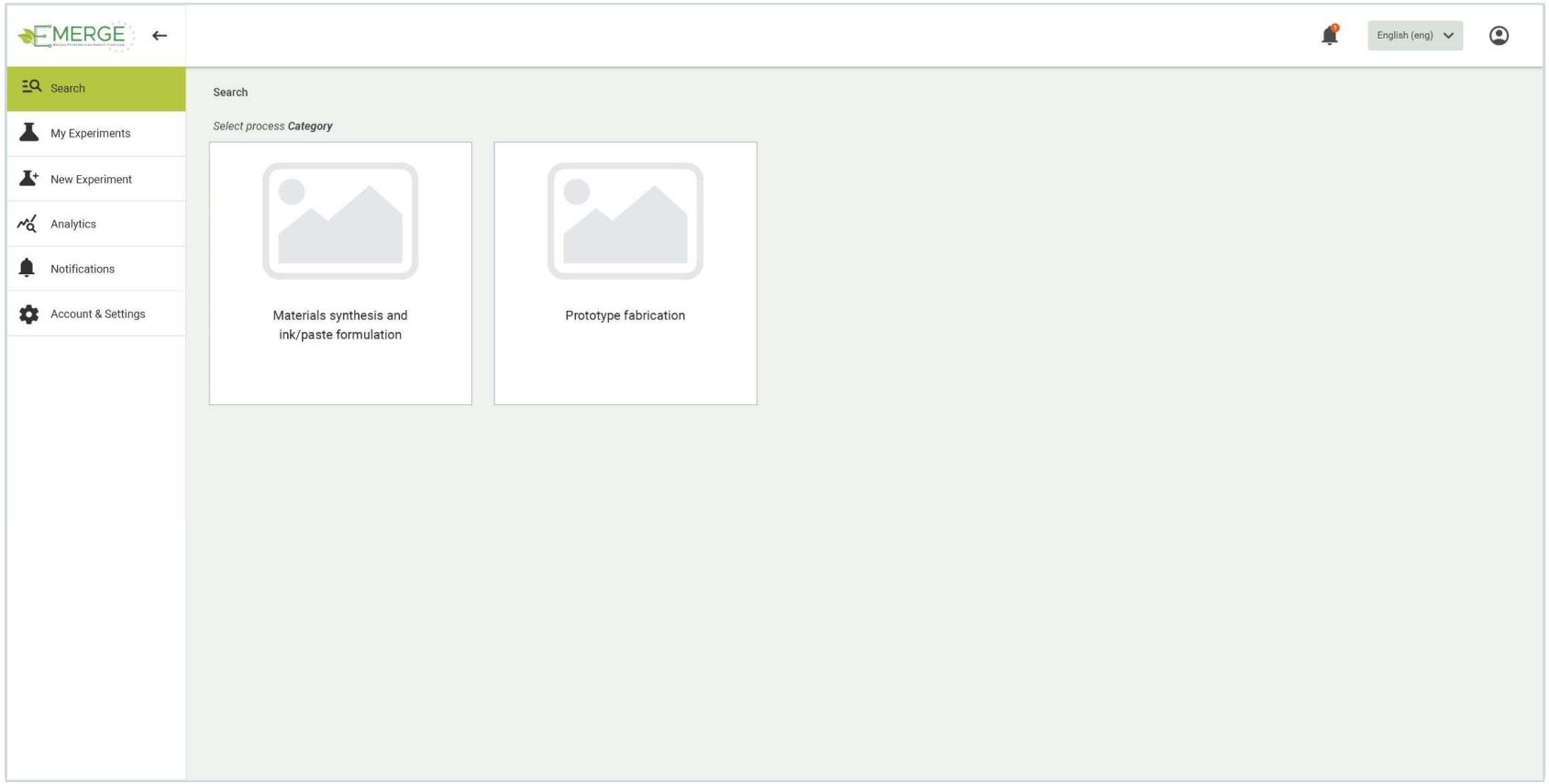
Experiment Data Structure of the Experiment Process in the DR



5.2

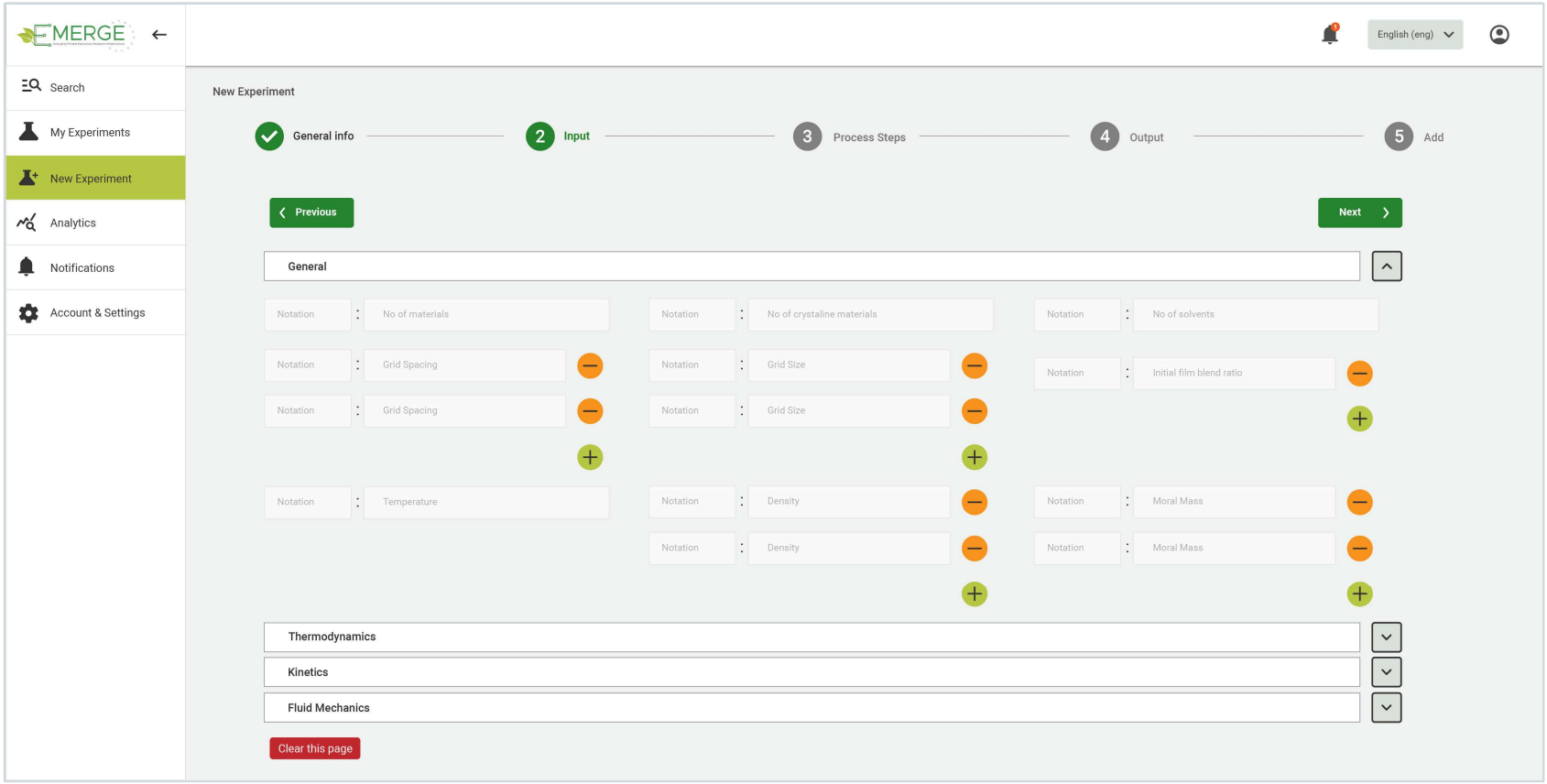
Emerge Mock-ups

Main Page | New Experiment Page | Analytics Page



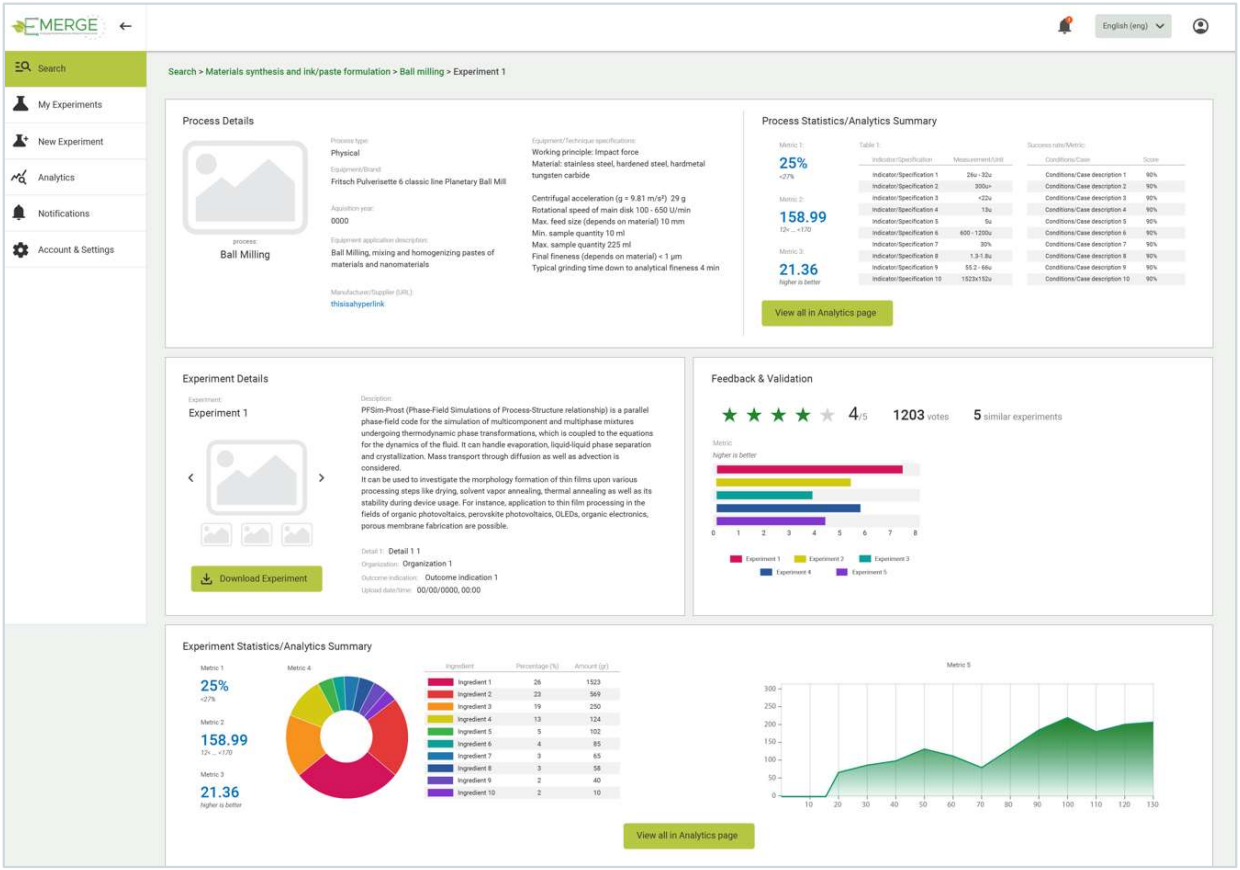
Main Page UI Mock-up

View of the main page with the available actions (left)



New Experiment UI Mock-up

View of creation and upload of a new experiment



Analytics UI Mock-up

View of a stored experiment with detailed descriptions and analytics

Thanks!

Any questions?

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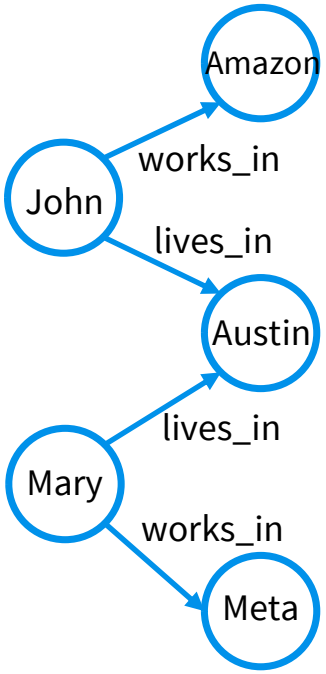
FastAPI + ArangoDB

- Among many RestAPI frameworks, FastAPI[4] was selected to be used in the KBest platform because its fast performance and high scalability.
- Due to its fast deployment, high performance, variety in node properties and powerful query language, the python driver of ArangoDB[5] was chosen as the graph-based database with which the Data Repository (DR) of the KBest platform would be developed.



[4] https://fastapi.tiangolo.com/
[5] https://github.com/ArangoDB-Community/python-arango